

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A computer-implemented method for trading in a financial derivative of an underlying asset, comprising:

determining a trend of a stochastic process, which is predictive of a future value of the asset and a predicted variance of the future value;

responsive to the trend and the variance, numerically calculating, using a computer, a density function indicative of a probability distribution of the value at a first time in the future;

based on the density function at the first time, recalculating the density function by integrating a random variable representative of the stochastic process over the density function at the first time to find the probability distribution of the value at a second time, subsequent to the first time; and

computing at least one of an expected value of the asset and an expected yield of the financial derivative based on the recalculated density function as a basis for making a trading decision with regard to the derivative of the asset based on the density function.

2-3. (Canceled)

4. (Currently amended) A method according to ~~claim 3~~ claim 1, wherein the random variable has a plurality of discrete values with a normal probability distribution.

5. (Currently amended) A method according to claim 4, wherein the random variable comprises a convex superposition of mutually-translated delta functions.

6. (Currently amended) A method according to ~~claim 3~~ claim 1, wherein integrating the density function random variable comprises computing an integrated value of the density function at each of a plurality of grid points in a coordinate space, wherein the value of the asset is represented by a coordinate in the space.

7. (Original) A method according to claim 6, wherein computing the integrated value comprises, for each of the plurality of grid points:

finding one or more corresponding points in the coordinate space at the first time, such that in a time step from the first time to the second time, the random variable makes a transition from the one or more corresponding points to the grid point at the second time; and

determining the function at the grid point at the second time by summing over the density function at the corresponding points.

8. (Original) A method according to claim 6, wherein recalculating the density function comprises interpolating the density function intermediate the grid points so as generate a smooth function over a selected range of calculation.

9. (Original) A method according to claim 8, wherein computing the integrated value comprises computing the value and a first derivative of the density function at the second time, and wherein interpolating the density function comprises fitting polynomial functions between the grid points so as to match the value and the first derivative of the density function computed at each of the grid points.

10. (Original) A method according to claim 9, and comprising recalculating the density function at a third time, subsequent to the second time, using the polynomial functions fitted between the grid points at the second time.

11. (Original) A method according to claim 1, wherein recalculating the density function comprises iteratively recalculating the density function at each of a plurality of times from the first time up to a final time.

12. (Currently amended) A method according to claim 1, wherein determining the trend comprises defining a vector having elements that comprise finding a multivariate trend with respect to a plurality of related variables that include the value of the asset, and finding a multivariate trend with respect to the plurality of related variables by modeling a change in the vector over time as a multidimensional Wiener process.

13. (Currently amended) A method according to claim 12, wherein determining the variance comprises and comprising finding a covariance matrix with respect to the plurality of related variables, wherein computing the density function comprises applying the covariance matrix in calculating the probability distribution of the future value of the asset.

14. (Original) A method according to claim 12, wherein the density function comprises a multivariate function, based on at least some of the plurality of related variables, in a multidimensional coordinate space.

15-16. (Canceled)

17. (Original) A method according to claim 1, wherein making the trading decision comprises deciding whether to carry out a transaction in the financial derivative at a given transaction price.

18. (Original) A method according to claim 1, wherein the financial derivative comprises an option exercisable at any of a plurality of points in time, and wherein making the trading decision comprises determining at which of the points to exercise the option.

19. (Currently amended) A method according to claim 18, wherein determining at which of the points to exercise the option comprises calculating a strategy function that is indicative of an expected value of a yield of the option, and deciding whether to exercise the option by

comparing a current value of the asset to a the expected value of the ~~strategy function~~ yield at one or more of the points in time.

20. (Currently amended) A method according to claim 1, wherein the derivative comprises a path-dependent option, and wherein recalculating the density function comprises computing a ~~path-dependent~~ cumulative density function by integrating the density function over time.

21. (Original) A method according to claim 20, wherein computing the path-dependent density function comprises finding a cumulative density function indicative of a path-dependent probability distribution of a value of the option.

22. (Currently amended) Apparatus for trading in a derivative of an underlying asset, comprising:

an input interface, which is arranged to receive input information regarding a trend of a stochastic process, which is predictive of a future value of the asset; and

a decision processor, which is adapted, responsive to a ~~the trend predictive of a future value of the asset~~ and to a predicted variance of the future value, to calculate a density function indicative of a probability distribution of the value at a first time in the future and, based on the density function at the first time, to recalculate the density function by integrating a random variable representative of the stochastic process over the density function at the first time to find the probability distribution of the value at a second time, subsequent to the first time, to compute at least one of an expected value of the asset and an expected yield of the financial derivative based on the recalculated density function, and to provide an output for use in making a trading decision with regard to the derivative of the asset based on the density function the at least

one of the expected value of the asset and the expected yield of the financial derivative.

23-24. (Canceled)

25. (Currently amended) Apparatus according to ~~claim 24~~ claim 22, wherein the random variable has a plurality of discrete values with a normal probability distribution.

26. (Currently amended) Apparatus according to ~~claim 24~~ claim 22, wherein the processor is adapted to compute an integrated value of the density function at each of a plurality of grid points in a coordinate space, wherein the value of the asset is represented by a coordinate in the space.

27. (Original) Apparatus according to claim 26, wherein the processor is adapted to interpolate the density function intermediate the grid points so as generate a smooth function over a selected range of calculation.

28. (Original) Apparatus according to claim 27, wherein the processor is adapted to interpolate the density function by fitting polynomial functions between the grid points so as to match a value and a first derivative of the density function computed by the processor at each of the grid points.

29. (Original) Apparatus according to claim 22, wherein the processor is adapted to iteratively recalculate the density function at each of a plurality of times from the first time up to a final time.

30. (Currently amended) Apparatus according to claim 22, wherein the trend comprises ~~finding~~ a multivariate trend with respective to a plurality of related variables that include the value of the asset, and wherein the processor is adapted to define a vector having elements that comprise the plurality of related variables and to find the multivariate trend by modeling a change in the vector over time as a multidimensional Wiener process.

31-32. (Canceled)

33. (Original) Apparatus according to claim 22, wherein the financial derivative comprises an option exercisable at any of a plurality of points in time, and wherein the processor is adapted to compute a strategy function for use in determining at which of the points to exercise the option.

34. (Currently amended) Apparatus according to ~~claim 1~~ claim 22, wherein the derivative comprises a path-dependent option, and wherein the processor is adapted to compute a ~~path-dependent~~ cumulative density function by integrating the density function over time.

35. (Currently amended) A computer software product for use in trading in a derivative of an underlying asset, the product comprising a computer-readable medium in which program instructions are stored, which instructions, when read by a computer, cause the computer, responsive to a trend of a stochastic process, which is predictive of a future value of the asset and to a predicted variance of the future value, to calculate a density function indicative of a probability distribution of the value at a first time in the future and, based on the density function at the first time, to recalculate the density function by integrating a random variable representative of the stochastic process over the density function at the first time to find the probability distribution of the value at a second time, subsequent to the first time, to compute at least one of an expected value of the asset and an expected yield of the financial derivative based on the recalculated density function, and to provide an output for use in making a trading decision with regard to the derivative of the asset based on the density function the at least one of the expected value of the asset and the expected yield of the financial derivative.

36-37. (Canceled)

38. (Currently amended) A product according to ~~claim 37~~ claim 35, wherein the random variable has a plurality of discrete values with a normal probability distribution.

39. (Currently amended) A product according to ~~claim 37~~ claim 35, wherein the instructions cause the computer to compute an integrated value of the density function at each of a plurality of grid points in a coordinate space, wherein the value of the asset is represented by a coordinate in the space.

40. (Original) A product according to claim 39, wherein the instructions further cause the computer to interpolate the density function intermediate the grid points so as generate a smooth function over a selected range of calculation.

41. (Original) A product according to claim 40, wherein the instructions cause the computer to determine the value and a first derivative of the density function at the second time, and to interpolate the density function by fitting polynomial functions between the grid points so as to match the value and the first derivative of the density function computed at each of the grid points.

42. (Currently amended) A product according to claim 35, wherein the instructions cause the computer to iteratively ~~recalculating~~ recalculate the density function at each of a plurality of times from the first time up to a final time.

43. (Currently amended) A product according to claim 35, wherein the trend comprises a multivariate trend with respective to a plurality of related variables that include the value of the asset, and wherein the instructions cause the computer to define a vector having elements that comprise the plurality of related variables and to find the multivariate trend by modeling a change

in the vector over time as a multidimensional Wiener process.

44. (Original) A product according to claim 43, wherein the density function comprises a multivariate function, based on at least some of the plurality of related variables, in a multidimensional coordinate space.

45-46. (Canceled)

47. (Currently amended) A product according to claim 35, wherein the financial derivative comprises an option exercisable at any of a plurality of points in time, and wherein the instructions cause the computer to calculate a strategy function that is indicative of an expected value of a yield of the option for determining at which of the points to exercise the option.

48. (Original) A product according to claim 35, wherein the derivative comprises a path-dependent option, and wherein the instructions cause the computer to determine a path-dependent cumulative density function by integrating the density function over time.